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The Role of Psychosocial Factors in Predicting Formalized
Human Milk Donation to Non-Profit Milk Banks

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Abstract

Human milk donation is important for improving the development of preterm infants. However, despite the importance of donating human milk, relatively little research has tested which factors predict this form of donation. This study assessed the association between psychosocial factors and formalized milk donation to a non-profit milk bank. This study used a cross-sectional design. Breastfeeding mothers ($N = 556$) completed measures assessing altruism, pride, instrumental and affective attitudes, subjective norm, perceived behavioral control, self-efficacy, anxiety, and intention to donate human milk to a non-profit milk bank. We also assessed whether participants requested additional information about donating human milk. Instrumental and affective attitude, subjective norm, and self-efficacy were positively associated with intention to donate milk. Self-efficacy and intention were also uniquely associated with requesting additional information. The intention to engage in formalized milk donation to a non-profit milk bank appears to be more likely if women view this action as beneficial, believe significant others support the action and think they have the ability to undertake this action. Women who think they have the ability to undertake this action and are willing to donate are more likely to request additional information. These findings might inform future experimental research and campaigns on human milk donation.

Keywords: Human milk donation, theory of planned behavior; self-efficacy

Introduction

Human milk reduces the likelihood of infection and mortality in newborn infants (World Health Organization, 2018). However, mothers of preterm infants can find it difficult to produce sufficient milk (Hill, Aldag, Chatterton, & Zinaman, 2005). In such cases, the infant may be provided with human milk that has been donated to a milk bank until the mother's supply is established. Receiving donor human milk lowers the risk of preterm infants developing necrotizing enterocolitis (Quigley, Embleton, & McGuire, 2018). Given the risk for developing necrotizing enterocolitis is higher in preterm infants (Gephart, McGrath, Effken, & Halpern, 2012), it is important that donor human milk is available for newborn intensive care units. Despite its importance, availability of donor human milk is limited (American Academy of Pediatrics, 2017; Underwood, 2013). Increasing the number of women who donate milk to non-profit milk banks offers one strategy for tackling this problem (Updegrave, 2013). Therefore, here we assess factors that are associated with the decision to donate human milk to non-profit milk banks.

Research has suggested people's perceptions, beliefs and feelings towards an action are likely to be strong predictors of whether the action is undertaken (Armitage & Conner, 2000). These psychosocial factors influence blood donation (Ferguson, Taylor, Keatley, Flynn, & Lawrence, 2012), organ donation (Morgan, Stephenson, Harrison, Afifi, & Long, 2008; O'Carroll, Foster, McGeechan, Sandford, & Ferguson, 2011) and sperm and egg donation (Shepherd, Kardzhieva, Bussey, & Lovell, 2018). The aim of this research was to assess the role of psychosocial factors in promoting and deterring women from donating human milk to a milk bank.

Psychosocial Factors

Aspects of the theory of planned behavior (Ajzen, 1991) have been applied to look at the role of psychosocial factors in predicting bodily donation (Hyde & White, 2009;

Shepherd et al., 2018). This theory posits that actions are determined by the evaluation of the action (attitude), the perception others view the action positively (subjective norm), and the perception they can control the action (perceived behavioral control). These factors are based on people's underlying beliefs related to the expected outcomes of the action, the perceived preferences of others, and their beliefs that they have the resources to undertake the behavior, respectively. According to this model, attitude, subjective norm and perceived behavioral control positively predict the intention to undertake the action, which subsequently positively predicts behavior. This model also suggests there is a direct link from perceived behavioral control to behavior. The theory of planned behavior has received considerable support (Armitage & Conner, 2001; McEachan, Conner, Taylor, & Lawton, 2011). However, it is important to note that this model has also received some criticism, including the fact that it focuses on rational factors and does not consider habitual or affective factors (for a discussion, see Sniehotta, Pesseau, & Araújo-Soare, 2014). In response to this, it has been suggested that it may be useful to consider extensions to this model (Conner, 2015).

One extension that can be applied to this model is to divide the attitude construct into two components: instrumental and affective attitudes (Conner, Rhodes, Morris, McEachan, & Lawton, 2011). The instrumental component refers to logical beliefs (e.g., 'Donating human milk is worthwhile'), while the affective component refers to feelings towards the action (e.g., 'Donating human milk is satisfying'). Similarly, research has suggested it important to assess the belief the individual has the ability to undertake the behavior (i.e., self-efficacy; Bandura, 1977). Although self-efficacy is linked to perceived behavioral control, these constructs are different; self-efficacy focuses on the perceived ability to undertake an action (i.e., factors internal to the individual), whilst perceived behavioral control focuses on the individual's perceived choice over whether or not the action could be undertaken (i.e., factors external to the individual; Armitage & Conner, 1999). For example, people may perceive that

they have high self-efficacy over donating milk ('I will be able to produce a sufficient supply of human milk to be a donor'), but think they have low perceived behavioral control ('I do not have the time to donate human milk').

Research has found these variables are associated with a variety of behaviors (Rhodes & Courneya, 2003; Shepherd et al., 2018), including blood donation (Conner, Godin, Sheeran, & Germain, 2013) and the initiation and maintenance of breastfeeding (Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012; Shepherd, Walbey, & Lovell, 2017). Research has demonstrated these factors may also influence the donation of human milk. For example, in one study in Brazil, people were more likely to donate human milk to a milk bank when they believed significant others supported the action (i.e., subjective norm; de Meneses, Oliveira, & Boccolini, 2017). Moreover, another study looked at a sample of mothers who informally shared human milk between themselves (i.e., peer-to-peer milk donors; Gribble, 2013). This study found that peer-to-peer milk donors stated they were reluctant to donate to a milk bank because they perceived it to be too difficult, thereby suggesting low self-efficacy may deter donation. However, little research has assessed a) the influence of different types of attitudes and b) whether subjective norm and self-efficacy influence donating human milk to a milk bank after controlling for these different attitudes.

Numerous other psychosocial factors have been found to influence bodily donation, particularly an individual's desire to help others in need (i.e., altruism). For example, in research from France, women stated that the desire to help others was one of the reasons why they donated to a human milk bank (Azema & Callahan, 2003). Another study, with an international sample, demonstrated that the desire to help others was commonly reported as the reason why women undertook peer-to-peer informal milk sharing via online social networks (Gribble, 2014). Similarly, in the US, mothers reported that they engaged in peer-to-peer informal milk sharing in order to help others (Perrin, Goodell, Fogleman, Pettus,

Bodenheimer, & Palmquist, 2016). This suggests human milk donation may be driven by selfless motives (e.g., altruism). Factors that are more selfish may also promote helping (Cialdini et al., 1987). For example, the desire for people to feel good about themselves (i.e., pride) has been shown to promote blood donation (Evans & Ferguson, 2014; Ferguson, Atsma, de Kort, & Veldhuizen, 2012), and sperm and egg donation (Shepherd et al., 2018). Moreover, in other research from the US, women who donated human milk to a non-profit milk bank reported feeling good about themselves (Candelaria, Soatz, & Giordano, 2018). Finally, feeling anxiety towards the process of donation has been found to deter blood donation (Robinson, Masser, White, Hyde, & Terry, 2008) and sperm and egg donation (Shepherd et al., 2018), and may therefore influence other forms of donation (i.e., donating human milk).

The Present Study

Previous research has suggested that a variety of psychosocial factors are likely to predict bodily donation (Ferguson, Atsma, et al., 2012; O'Carroll, Foster, et al., 2011; Shepherd et al., 2018). Moreover, research suggests that some of these psychosocial factors might be linked with donating human milk (e.g., Azema & Callahan, 2003; Candelaria et al., 2018; de Meneses et al., 2017; Gribble, 2013, 2014; Perrin et al., 2016). However, much of the research on human milk donation has relied on women, usually pre-existing donors, reporting why they have donated. Although this research is important and valuable for exploring the factors that may influence donation, further research is needed to assess the extent to which such factors predict human milk donation intention and behavior. This is especially important given that people may not be aware of the reasons behind their actions (Nisbett & Wilson, 1977). Therefore, the aim of this research was to assess the extent to which each of the psychosocial factors outlined predicts the intention to donate human milk

to a non-profit milk bank, and whether or not participants request information about how to donate.

Method

Design

A cross-sectional design was used to assess factors associated with human milk donation intention and requesting additional information about becoming a milk donor (henceforth referred to as requesting information). The predictor variables were instrumental and affective attitude, subjective norm, perceived behavioral control, self-efficacy, altruism, pride and anxiety towards donation. The outcome variables were human milk donation intention and requesting information. Requesting information was measured by assessing whether or not potential donors wanted more information about becoming a donor.

Participants

This study was conducted in the UK. In the UK, donating human milk occurs formally through non-profit milk banks supported by the United Kingdom Association for Milk Banking. These non-profit milk banks distribute pasteurized donor human milk. We assessed the factors that motivate women in the UK to donate human milk through an online survey. The researchers searched social media for UK-based breastfeeding or early parenting forums, pages and groups. For each relevant group, the researchers posted, or asked the administrator to post, the recruitment advert. The recruitment advert stated that researchers were looking for breastfeeding mothers to complete a short online questionnaire assessing perceptions about donating milk. This advert also stated inclusion and exclusion criteria, and provided a link to the survey.

This study used a convenience sample. Eligibility criteria stated that mothers had to be 18 years or older, currently breastfeeding and living in the UK. People who had previously donated, or were currently donating, milk were asked not to take part because we were

interested in factors that influence prospective donation. Participants were also asked not to participate if they smoked or used nicotine replacement therapy, consumed 1 to 2 units of alcohol once or twice a week, had recently used recreational drugs, or been diagnosed with HIV, hepatitis B or C, human T-lymphotric virus or syphilis. These exclusion criteria ensured participants were eligible donors in line with UK guidelines (National Institute for Health and Care Excellence, 2010). Participants were informed, in both the recruitment advert and information sheet, they should only take part if they satisfied the eligibility criteria. As such, participants self-selected as being eligible. We aimed to recruit a large a sample as possible to increase power. A total of 578 self-selected participants consented to take part. However, 21 of these participants did not complete the study, and, were removed prior to analysis. Moreover, an additional participant asked to be withdrawn after completing the study. Therefore, the final sample consisted of 556 women (for demographic information, see Table 1).

Materials and Procedure

Ethical approval was obtained from the authors' institutional research board. All participants were presented with an information sheet explaining the study and outlining eligibility criteria. If the participant gave consent, they were asked to provide information about themselves and their child (see Table 1). Participants were then presented with information about the donation process in the UK. This information stated the need for donor milk for preterm infants, the screening process for potential donors and the process of how milk is provided to a milk bank. This information also stated that milk is tested, pasteurized and then frozen ready for use. Participants then completed the following measures.

Instrumental and affective attitudes. The attitudes were assessed using scales adapted from Conner et al. (2011). Participants were presented with the following statement: "For me, donating breast milk during the next six months would be...". This was followed by

nine semantic differentials. Five of these assessed instrumental attitudes (useless/useful, unimportant/important, worthless/valuable, not worthwhile/worthwhile, harmful/beneficial). The remaining four semantic differentials assessed affective attitudes (unsatisfying/satisfying, unpleasant/pleasant, unenjoyable/enjoyable, boring/exciting). These items, and the items used in the other scales, were rated on a scale ranging from one to five. We then calculated the mean of the instrumental ($\alpha = .87$) and affective attitude items ($\alpha = .86$).

Subjective norm. Subjective norm was assessed using three items adapted from Shepherd et al. (2017). These items were: “People who are important to me (e.g., friends and family) would support me donating/think it is important for me to donate/think it is beneficial for me to donate my breast milk in the next 6 months” ($\alpha = .78$; 1 = *Strongly disagree*, 5 = *Strongly agree*).

Perceived behavioral control and self-efficacy. These scales were adapted from Armitage and Conner (1999). Three items measured perceived behavioral control: “Whether or not I donate my breast milk in the next 6 months is entirely up to me”, “I have personal control over donating my breast milk in the next 6 months” and “I feel that whether I donate my breast milk in the next 6 months is beyond my control” (reverse scored; $\alpha = .81$). The three self-efficacy items were: “I believe I have the ability to donate my breast milk in the next 6 months”, “I am capable of donating my breast milk in the next 6 months” and “I am confident I will be able to donate my breast milk within the next 6 months” ($\alpha = .88$; 1 = *Strongly disagree*, 5 = *Strongly agree*).

Anxiety towards donating. Although previous research has measured anxiety towards donating in the context of gamete donation (Shepherd et al., 2018), we felt the items used in this previous research did not adequately reflect the concerns relating to human milk donation. Therefore, we devised our own anxiety towards donation scale. The items were: “I am worried that donating my breast milk may interfere with my milk supply”, “I am

concerned that donating my breast milk may make it harder for me to feed my infant”, “I am anxious that donating my breast milk may be painful” and “I am worried that donating my breast milk may cause physical discomfort” ($\alpha = .70$; 1 = *Not at all*, 5 = *Very much so*).

Pride. Based on previous research (Evans & Ferguson, 2014; Ferguson, Taylor, et al., 2012, Shepherd et al., 2018), three items assessed pride: “If I were to donate my breast milk in the next 6 months I would feel good about myself”, “If I were to donate my breast milk in the next 6 months I would feel proud” and “If I were to donate my breast milk in the next 6 months I would feel like a good person” ($\alpha = .91$; 1 = *Not at all*, 5 = *Very much so*).

Altruism. The altruism scale was taken from previous research (Ferguson, Atsma, et al., 2012). This scale consisted of five items. These items included: “I prefer working toward my own well-being than toward the well-being of others” (reverse scored), “I try to work towards the well-being of society” and “It is important to me that I help others” ($\alpha = .66$; 1 = *Strongly disagree*, 5 = *Strongly agree*). Further analyses were undertaken to see if the reliability of this scale could be improved by removing an item. However, these analyses found that this did not improve the reliability of the scale. Therefore, all items from the original scale were retained.

Intention. The four intention items were: “I intend to donate my breast milk in the next 6 months”, “I am likely to donate my breast milk in the next 6 months”, “I am reluctant to donate my breast milk in the next 6 months” (reverse scored) and “I will donate my breast milk in the next 6 months” ($\alpha = .87$; 1 = *Strongly disagree*, 5 = *Strongly agree*).

Requesting information. Becoming a human milk donor is a lengthy process. Potential donors need to go through a screening process before they can donate. Initially, milk bank staff have an informal discussion with the potential donor and may need to look through medical records. Potential donors are also required to undertake blood tests to check for infections that could be passed on to the recipients of the human milk. Given this lengthy

process, there were practical limitations for assessing actual milk donating behavior. Therefore, in this study we assessed whether participants undertook an initial step to becoming a human milk donor; specifically, whether or not they requested more information about becoming a milk donor. Participants were asked whether they wanted more information about becoming a milk donor (yes versus no) and, told that if they selected ‘yes’, they would receive more information at the end of the study. Given that this measure assessed whether participants were willing to commit to some initial future steps to becoming a donor, rather than actual behavior, this was a behavioroid measure of human milk donation (Aronson, Ellsworth, Carlsmith, & Gonzales, 1990). Finally, participants were then debriefed about the aims of the research.

Statistical Analysis

Data were analyzed using SPSS (Version 24; IBM Corp., 2016). Correlation analyses were conducted to assess the association between the variables. Following this, multiple regression analysis was used to assess the unique association of each of the variables with the intention to donate milk. We also performed a logistic regression analysis to assess a) whether intention predicted requesting information and b) whether the psychosocial variables predicted requesting information, after controlling for intention. Therefore, in this analysis intention was entered into the model in Step 1 and the psychosocial variables were entered into the model in Step 2.

Results

Preliminary analysis revealed some variables contained outliers (i.e., scores three standard deviations from the mean). We found outliers for the instrumental and affective attitudes, perceived behavioral control, anxiety, pride and altruism variables. Values that were outliers were removed to prevent them biasing the data.¹

Descriptive Statistics and Correlation Analyses

The mean level of anxiety was below the midpoint of the scale (3, Table 2). As such, people were unlikely to feel anxious. Interestingly, the mean level of intention was around the midpoint of the scale, suggesting that overall there was not a tendency for people to either intend to donate or not. The mean levels of instrumental attitude, perceived behavioral control, pride and altruism were high (i.e., above 4). These high means suggest that people viewed human milk donation as beneficial, believed they could choose whether or not they donated, were likely to feel pride if they donated and general tried to help others in society.

The correlation analyses found that intention to donate was positively associated with instrumental and affective attitude, subjective norm, perceived behavioral control, self-efficacy, pride and altruism (Table 2). By contrast, anxiety was negatively associated with intention to donate. Similarly, requesting information was positively associated with instrumental and affective attitudes, subjective norm, self-efficacy, pride, altruism and intention. Anxiety, on the other hand, negatively associated with requesting information. Although there were some close associations between variables, the lowest tolerance value (.50) was greater than .20; data therefore were unlikely biased by multicollinearity (Menard, 1995).

Regression Analyses

Intention to donate. Multiple regression analysis revealed psychosocial factors accounted for 50% of the variance in intention to donate, $R^2 = .50$, $F(8, 502) = 61.87$, $p < .001$. Instrumental attitude, affective attitude, subjective norm and self-efficacy were positively associated with the intention to donate (Table 3). By contrast, perceived behavioral control was negatively associated with intention. The other variables were not associated with intention.

Requesting information. There were 335 women (60.25%) who requested additional information about donation. Logistic regression analysis revealed that intention accounted for a significant proportion of variance in this behavioroid measure, $\chi^2(1) = 111.69, p < .001$. As expected, a greater intention to donate was associated with an increased likelihood of requesting information (see Table 4, Step 1). Intention remained a significant predictor of requesting information when the psychosocial factors were entered into the model (Table 4, Step 2). Interestingly, self-efficacy was also positively associated with requesting information. By contrast, affective attitude was negatively associated with requesting information. The other variables were not associated with requesting information.

Discussion

This research assessed the influence of psychosocial factors on donating human milk to a non-profit milk bank. Generally, donating human milk was viewed as beneficial. Participants also thought they were unlikely to feel anxious about donating, and likely to feel pride. People also generally felt they had high perceived behavioral control over donating. Importantly, the psychosocial factors predicted the intention to donate human milk and whether or not the participant requested information about donating. Indeed, we found that instrumental and affective attitude were positively associated with intention to donate milk, as were subjective norm and self-efficacy. Moreover, requesting information was positively associated with self-efficacy and intention.

Although the majority of our findings were in line with previous research, we did have some unexpected results. For example, we found that affective attitude negatively predicted the behavioroid measure after controlling for the other psychosocial factors. Interestingly, this relationship was non-significant prior to controlling for intention. As such, this relationship is only present after controlling for more deliberate processing, suggesting it may be due to more automatic decision making systems. Another unexpected finding was

that, in contrast to the theory of planned behavior, we found that perceived behavioral control did not predict our behavioroid measure, but negatively predicted intention. Previous research has suggested that self-efficacy is a stronger predictor of behavior than perceived behavioral control (Rodgers, Conner, & Murray, 2008), which is in line with our findings. Similarly, further analysis revealed that perceived behavioral control became a non-significant positive predictor of intention when self-efficacy was removed from the model. This suggests that perceived behavioral control only negatively predicts intention when the internal factors that may influence donation (i.e., self-efficacy) are taken into account. Although both these unexpected findings are interesting, further research is needed to test their replicability.

Previous meta-analyses have suggested that the theory of planned behavior variables explain between 14%-24% in variance in behavior (McEachan et al., 2011). The amount of variance explained in the behavioroid measure (Nagelkerke $R^2 = .31$) was slightly larger than these estimates. This may, in part, reflect the use of a behavioroid rather than a prospective behavioral measure. It is also likely to be due to other factors. Indeed, the amount of variance explained in our study is similar to previous research that has included self-efficacy alongside the theory of planned behavior constructs (Hagger, Chatzisarantis, & Biddle, 2002). Therefore, it may be larger than previous theory of planned behavior research because of the other psychosocial factors assessed in this study. It is also important to consider the amount of variance explained in this study relative to other studies on bodily donation. Previous research has suggested that the amount of variance psychosocial factors explain in bodily donation intention varies from around 40% (Conner et al., 2013) to 77% (Hyde, Knowles, & White, 2013). As such, the 50% of variance in intention explained by psychosocial variables in this study is within the range found in previous research. The amount of variance explained in the behavioroid measure in this study (Nagelkerke $R^2 = .31$) is higher than previous blood donation research (Nagelkerke $R^2 = .18$, Conner et al., 2013). However, this may reflect the

fact that a) we used a behavioroid measure whereas previous research measured prospective behavior and b) we measured self-efficacy.

This study is in line with previous research that found support from significant others (i.e., subjective norm) is likely to promote donating human milk to a milk bank (de Meneses et al., 2017). Moreover, by demonstrating that perceptions of low self-efficacy deter breastfeeding mothers in general, this study extends previous research that found peer-to-peer milk sharers do not donate to a milk bank because they find the process difficult (Gribble, 2013). Importantly, we extend research in this area by demonstrating a) these factors are associated with the intention to donate human milk to a non-profit milk bank after controlling for other psychosocial factors, b) instrumental and affective attitudes also predict intention and c) self-efficacy (but not subjective norm) predicts whether or not the participant requested information about donation.

Interestingly, findings reported here are discrepant with some previous research. For example, anxiety and pride have been found to predict other forms of donation (Robinson et al., 2008; Shepherd et al., 2018), but were not associated with human milk donation. Similarly, altruism predicted donating human milk to a milk bank in previous research (Azema & Callahan, 2003), but that was not the case here. This may, in part, be due to the specificity of the items. In this study, the items that measured theory of planned behavior constructs included a specific timeframe for undertaking the action. However, the altruism and anxiety items did not include this timeframe. This difference in item specificity may have reduced the likelihood of these constructs predicting intention or the behavioroid measure. There may have also been construct-specific reasons why these factors did not predict donation. For example, the processes involved in blood and gamete donation are more intrusive than human milk donation, which is a much more natural process. As such, human milk donation may be less anxiety-invoking. This may have reduced the likelihood of anxiety

predicting donation. Similarly, some aspects of pride are related to public recognition (Carver, Sinclair, & Johnson, 2010). However, there may be a lack of public knowledge about human milk donation compared to other forms of donation, making pride less likely to promote action. In addition, altruism and pride may not have been significant predictors of donation because we only assessed some forms of altruism. Blood donation research has suggested that there are different forms of altruism (Ferguson & Lawrence, 2016). For example, people donate blood because they think it is important to help others (pure altruism), believe others are unlikely to donate (reluctant altruism), or want to gain a positive feeling (warm glow; Ferguson, Atsma, et al., 2012). In this study, we measured pure forms of altruism and positive feelings of pride associated with donation (i.e., warm glow). However, other dimensions of altruism were not assessed, and this represents a limitation of the study.

It is also important to discuss other limitations of the study. First, although the majority of the measures were based on previous studies, research validating these scales is limited. This is likely to stem partly from the lack of research into human milk donation. Second, this study used a cross-sectional design. The use of this design allowed us to assess the role of numerous psychosocial factors on human milk donation. However, we were unable to determine causality. Therefore, further experimental research is needed to determine whether the psychosocial factors that were significant predictors in this study have a causal effect on human milk donation. Third, it may be useful to apply a qualitative approach to fully understand how the psychosocial factors that were assessed apply to human milk donation. For example, it may be the case that human milk donation is an anxiety-invoking process, but that this was not captured in our anxiety items. Applying a qualitative approach would allow researchers to fully understand how such psychosocial factors relate to human milk donation.

It is also important to consider the outcome variables. We measured human milk donation intention and the behavioroid measure of whether or not the participant requested additional information. However, we did not include a prospective measure of human milk donation. This was, in part, due to human milk donation being a lengthy process. Moreover, although there is an intention-behavior gap (Sheeran, 2002), research has suggested that intention is likely to predict prospective behavior (e.g., Conner et al., 2013; O'Carroll, Dryden, Hamilton-Barclay, & Ferguson, 2011). Therefore, given that this was an initial study assessing the predictive power of psychosocial factors on human milk donation, we followed previous research (Shepherd et al., 2018) by measuring intention and requesting information, as we felt this was sufficient at this stage to develop an initial evidence base. However, a larger scale study is needed to assess the extent to which these factors also predict more long-term prospective behaviors, such as becoming a donor.

Future studies should also consider other models that could be applicable to human milk donation. In this study, we found a large proportion of variance in the behavioroid measure was not explained by intention or the psychosocial variables. Therefore, it may be useful for future studies to consider models that include additional pathways to behavior, such as the prototype willingness model (see Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Based on this model, it could be useful to consider the prototypical image of a human milk donor and their willingness to become a donor. Importantly, willingness has been found to predict behavior even after controlling for intention (Todd, Kothe, Mullan, & Monds, 2016). This suggests that the inclusion of factors within this model may help to improve the amount of variance that is explained in human milk donation.

Despite these limitations, the findings reported here have clear implications, especially with respect to the health literature. A growing body of research is demonstrating the influence of emotions on health behaviors (e.g., Onwezen, Bartels, & Antonides, 2014;

Sandberg & Conner, 2008; Witte & Allen, 2000). However, relatively little research has assessed how the influence of emotions might vary depending on the type of health behavior. Previous research on bodily donation has suggested that this is likely to be driven by emotional factors (e.g., Ferguson, Taylor, et al., 2012; O'Carroll, Foster, et al., 2011; Shepherd et al., 2018). However, here we find that human milk donation is more likely to be driven by logical factors, such as self-efficacy. As mentioned above, this may reflect the nature of human milk donation in comparison to other forms of bodily donation. Given that emotional factors were less likely to be associated with human milk donation than other forms of bodily donation, this study emphasizes the importance of considering not only the theoretical model, but also the health behavior to which the model is applied.

This research found that formalized milk donation to a non-profit milk bank was associated with intention and self-efficacy. This suggests non-profit milk banks in the UK, Europe and across the world may improve donation by targeting these factors. However as this study used a cross-sectional design, causality cannot be inferred. As such, experimental research is needed to test the effectiveness of incorporating such variables into interventions. Moreover, this study used a convenience sample, and this has the potential to cause bias. For example, our sample contained predominantly White mothers who were somewhat older than the average age of mothers in the UK. Therefore, future research might use other sampling methods to obtain a more representative sample.

In conclusion, pasteurized donor human milk is beneficial and important for preterm infants. However, relatively little research has assessed factors that promote and deter human milk donation. This research suggests donation intention is associated with the belief that it is important and satisfying to donate, that significant other support donation, and that one has the ability to donate. Moreover, people were likely to request information when intention and self-efficacy were high. Further research in this area can help to determine whether

interventions that target these factors are likely to increase donation rates to non-profit milk banks in the UK, Europe and across the world.

Endnotes

¹ We analyzed the data both with and without the outliers included. In the linear multiple regression analysis we found that, prior to removing outliers, intention was positively predicted by instrumental and affective attitudes, subjective norm and self-efficacy. In the logistic regression analysis we found that, prior to removing outliers, requesting information was positively predicted by intention, instrumental attitude and self-efficacy. In this analysis, pride was a near-significant predictor ($p = .050$). As such, some of the findings that were significant when outliers were included in the model became non-significant once the outliers were excluded (e.g., instrumental attitude predicting the behavioroid measure). We also found some unexpected results when outliers were removed (i.e., perceived behavioral control negatively predicting intention and affective attitude negatively predicting requesting information). We decided to report the data that did not contain the outliers because a) it ensured that the outliers did not bias out findings and b) it made the findings more transparent.

Conflict of Interest

The authors are independent researchers from a UK university who are not affiliated with any milk banks. The authors do not have any conflict of interest relating to this research.

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Tables

Table 1. Demographic information for the participants.

	Statistics
Ethnicity	<i>n</i> (%)
White	535 (96.22%)
Black	3 (0.54%)
Asian	3 (0.54%)
Mixed race	12 (2.16%)
Other	2 (0.36%)
Prefer not to say	1 (0.18%)
Marital status	<i>n</i> (%)
Single	15 (2.70%)
In a relationship	535 (96.22%)
Divorced	3 (0.54%)
Other	3 (0.54%)
Currently on maternity leave	<i>n</i> (%)
No	249 (44.78%)
Yes	307 (55.22%)
Method of delivery	<i>n</i> (%)
Vaginal delivery	402 (72.30%)
Caesarean delivery	154 (27.70%)
Number of children receiving human milk ^a	<i>n</i> (%)
1	478 (85.97%)
2	68 (12.23)
3	3 (0.54%)
Age of participant	<i>M</i> (<i>SD</i>)
	32.72 (4.69)
Age of youngest breastfed child (weeks)	<i>M</i> (<i>SD</i>)
	46.93 ^b (39.30)

^a Seven participants did not provide sufficient data to accurately determine this. As such, this was treated as missing data.

^b This variable was skewed by some high scores. As such, the median value (34.76 weeks) may be more informative.

Table 2

Descriptive statistics and intercorrelation assessing the association between the psychosocial variables and the association of these psychosocial variables with the intention to donate human milk to a non-profit milk bank and whether or not they request information about how to donate human milk to a non-profit milk bank requesting information.

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Instrumental attitude	543	4.20	0.75	-									
2. Affective attitude	541	3.77	0.84	.49***	-								
3. Subjective norm	556	3.26	0.87	.35***	.32***	-							
4. Perceived behavioral control	550	4.31	0.83	.03	.08	.09*	-						
5. Self-efficacy	556	3.21	1.02	.19***	.29***	.25***	.31***	-					
6. Anxiety	550	1.63	0.71	-.24***	-.32***	-.27***	-.01	-.17***	-				
7. Pride	542	4.60	0.62	.30***	.36***	.20***	.01	.06	-.10*	-			
8. Altruism	554	4.08	0.46	.23***	.19***	.19***	-.002	.08*	-.19***	.08	-		
9. Intention	556	2.84	0.83	.36***	.46***	.33***	.12**	.62***	-.26***	.20***	.17***	-	
10. Requesting information	556	-	-	.23***	.17***	.22***	.06	.36***	-.10*	.15**	.10*	.46***	-

Note. * = $p < .05$, ** = $p < .01$, and *** = $p < .001$.

Table 3

Linear multiple regression analysis assessing the unique association of each of the psychosocial variables on the willingness to donate human milk to a non-profit milk bank (n = 511).

Variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	95% CI for B [LL, UL]	<i>sr</i> ²
Constant	-0.03	0.35		0.10	.924	[-0.72, 0.65]	
Instrumental attitude	0.13	0.04	.11	2.91	.004	[0.04, 0.21]	.01
Affective attitude	0.19	0.04	.19	4.80	< .001	[0.11, 0.26]	.02
Subjective norm	0.09	0.03	.09	2.50	.013	[0.02, 0.15]	.01
Perceived behavioral control	-0.08	0.03	-.08	2.32	.021	[-0.14, -0.01]	.01
Self-efficacy	0.42	0.03	.52	14.62	< .001	[0.36, 0.48]	.21
Anxiety	-0.06	0.04	-.05	1.49	.138	[-0.14, 0.02]	<.01
Pride	0.05	0.05	.04	1.13	.261	[-0.04, 0.14]	<.01
Altruism	0.05	0.06	.03	0.93	.352	[-0.06, 0.17]	<.01
R ²	.50***						

Note. * = $p < .05$, ** = $p < .01$, and *** = $p < .001$. *SE* = standard error, *CI* = confidence intervals, *LL* = lower limit, *UL* = upper limit, *sr*² = squared semipartial correlation.

Table 4

Binary logistic regression assessing the unique association of each of the psychosocial variables on whether or not the participants requested additional information about how to donate human milk to a non-profit milk bank (n = 511).

Variable	<i>B</i>	<i>SE</i>	Wald	<i>p</i>	<i>OR</i>	95% CI [LL, UL]	Nagelkerke pseudo R ²	Step	Model
Step 1							.27	$\chi^2(1) = 111.69,$ $p < .001$	-
Constant	-3.35	0.43	62.15	< .001					
Intention	1.40	0.15	83.84	< .001	4.06	[3.01, 5.48]			
Step 2							.31	$\chi^2(8) = 17.89,$ $p = .022$	$\chi^2(9) = 129.58, p$ < .001
Constant	-5.54	1.42	15.34	< .001					
Intention	1.17	0.20	35.46	< .001	3.23	[2.19, 4.74]			
Instrumental attitude	0.28	0.17	2.66	.103	1.32	[0.95, 1.85]			
Affective attitude	-0.36	0.16	4.90	.027	0.70	[0.51, 0.96]			
Subjective norm	0.26	0.14	3.36	.067	1.29	[0.98, 1.70]			
Perceived behavioral control	-0.06	0.13	0.18	.668	0.95	[0.73, 1.22]			
Self-efficacy	0.34	0.14	6.02	.014	1.40	[1.07, 1.83]			
Anxiety	0.07	0.16	0.21	.649	1.07	[0.79, 1.46]			

Pride	0.21	0.18	1.33	.249	1.23	[0.87, 1.75]
Altruism	0.07	0.23	0.10	.757	1.08	[0.68, 1.70]

* = $p < .05$ and *** = $p < .001$. SE = standard error, OR = odds ratio, CI = confidence intervals. LL = lower limit, UL = upper limit.